

EVIDENCE BASED MEDICINE IN SPACE FLIGHT: EVALUATION OF INFLIGHT VISION DATA FOR OPERATIONAL DECISION-MAKING

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Introduction: Due to recently identified vision changes associated with space flight, JSC Space and Clinical Operations (SCO) implemented broad mission-related vision testing starting in 2009. Optical Coherence Tomography (OCT), 3 Tesla Brain and Orbit MRIs, Optical Biometry were implemented terrestrially for clinical monitoring. While no inflight vision testing was in place, already available on-orbit technology was leveraged to facilitate in-flight clinical monitoring, including visual acuity, Amsler grid, tonometry, and ultrasonography. In 2013, on-orbit testing capabilities were expanded to include contrast sensitivity testing and OCT. As these additional testing capabilities have been added, resource prioritization, particularly crew time, is under evaluation.

Methods: We used descriptive statistics to assess the clinical value of tonometry and contrast testing, which occurs preflight and on flight days 30, 90, and 30 days prior to landing, and post-flight. We compared intraocular pressure (IOP, mmHg) and threshold contrast (%) to clinical normal ranges. We also compared absolute and change in IOP and threshold contrast measures to clinical outcomes--refractive error change, anatomical changes, and disc edema.

Results: In ISS crewmembers, IOP and threshold contrast on orbit are within normal clinical ranges. Visualizations of trends in IOP and threshold contrast measures do not reveal any obvious relationships with vision outcomes but formal statistical analyses will be conducted.

Discussion: SCO has discontinued routine in-flight tonometry and contrast testing, effective with Expedition 40, although these capabilities will continue to be available as needed for clinical care. Future evaluation of routine on-orbit ultrasound, OCT, and fundoscopy testing is planned in order to maximize medical resources and crew time.

Learning Objective 1: To understand how evidence based medicine using “small” data can be used to make operational decisions.